

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference M-7045 PCT	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/US00/07357	International filing date (day/month/year) 20/03/2000	Priority date (day/month/year) 22/03/1999
International Patent Classification (IPC) or national classification and IPC G01N21/17		
Applicant BOXER CROSS INCORPORATED		


1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 11 sheets, including this cover sheet.

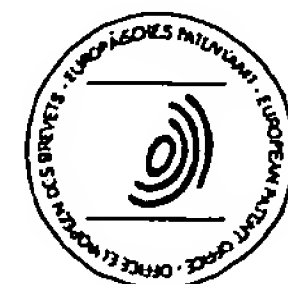
☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☒ Lack of unity of invention
- V ☐ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 21/10/2000	Date of completion of this report 30.03.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Meyer, F Telephone No. +49 89 2399 2233



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/US00/07357

I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).):*

Description, pages:

1-51 as originally filed

Claims, No.:

1-37 as originally filed

Drawings, sheets:

1/13-13/13 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

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☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☒ the entire international application.

☐ claims Nos. .

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):

☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 1-37 are so unclear that no meaningful opinion could be formed (*specify*):
see separate sheet

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☐ no international search report has been established for the said claims Nos. .

2. A meaningful international preliminary examination report cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

☐ the written form has not been furnished or does not comply with the standard.

☐ the computer readable form has not been furnished or does not comply with the standard.

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

☐ restricted the claims.

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International application No. PCT/US00/07357

- ☐ paid additional fees.
- ☐ paid additional fees under protest.
- ☐ neither restricted nor paid additional fees.
- 2. ☒ This Authority found that the requirement of unity of invention is not complied and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.
- 3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is
 - ☐ complied with.
 - ☒ not complied with for the following reasons:
see separate sheet
- 4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:
 - ☒ all parts.
 - ☐ the parts relating to claims Nos. .

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

1. Reference is made to the following document:

D1: US 5 042 952

Re Item III

2. The question whether the subject-matter of the claims appears to be novel, to involve an inventive step, or to be industrially applicable have not been examined because the claims, and in particular the independent **claims 1, 22 and 32**, are so unclear (see paragraph 5. below) that no meaningful opinion could be formed.

Re Item IV

3. The application lacks unity within the meaning of Rule 13.1 PCT for the following reasons:
- 3.1. The common concept linking together the independent **claims 1, 22 and 32** is the following:
- A method / an apparatus for performing a measurement in a region of a waver having a plurality of background carriers (claims 1, 32) / a method for performing a measurement in a region of a waver having a plurality of charge carriers, the plurality consisting of a first number of charge carriers (claim 22); the method / apparatus comprising
 - creating a plurality of excess carriers in the region (claim 1) / stimulating the region, the plurality consisting of a second number of charge carriers during the stimulation (claim 22) / means for creating a number of excess carriers in the region (claim 32); and
 - measuring a value of a signal affected by the creating of a plurality of excess carriers (claim 1) / using a measurement device to obtain a value of a signal affected by the stimulating (claim 22) / a measurement device to obtain a value of a signal affected by the creating of a plurality of excess carriers (claim 32).
- 3.2. This common concept is not novel, see D1 (col.5 l.3, col.6 l.33-34; col.5 l.7-9;

col.5 l.20-37).

3.3. The following further features are also disclosed in D1:

- (means for) creating the plurality of excess carriers in the region such that the number of excess carriers is modulated in time at a predetermined frequency (D1: col.5 l.7-9, col.8 l.12-15);
- a source of a probe beam of electromagnetic radiation (col.8 l.58-59);
- measuring amplitude and phase of an interference signal, the interference signal being obtained by interference between a reference beam and a portion of a probe beam of electromagnetic radiation reflected by the plurality of excess carriers in the region, the portion of the probe beam being modulated in phase with modulation of the plurality of excess carriers / an interferometer located in a path of a signal obtained by interference between a reference beam and a portion of the probe beam of electromagnetic radiation reflected by the plurality of excess carriers in the region, the portion of the probe beam being modulated in phase with modulation of the plurality of excess carriers (col.9 l.39-41, col.12 l.1-31);

3.4. Hence it is considered that the following separate groups of inventions are not so linked as to form a single general inventive concept:

- (i) **Claims 1 and 32:** A method (an apparatus) for performing a measurement in a region of a waver having a plurality of background carriers characterized in that it comprises: (means for) creating a plurality of excess carriers in the region, the number of excess carriers being modulated in time at a predetermined frequency that is sufficiently small to ensure that a majority of carriers move out of the region by diffusion
- (ii) **Claim 22:** A method for performing a measurement in a region of a waver having a plurality of charge carriers, characterized in that the method comprises: operating a simulator to generate a simulated value of the signal based on a predetermined profile of concentration of active dopants in the region and conditions of the stimulating; and comparing the simulated value with the measured value to determine if the simulated value matches the measured value.

Re Item VII

- 4.1. The independent claims are not properly delimited from the closest prior art (document D1) and cast in a two-part form (Rule 6.3(b) PCT).
- 4.2. The features of the claims are not provided with reference numerals placed in parentheses (Rule 6.2(b) PCT).
- 4.3. In the description (p.1 l.15-16, p.1 l.25), the applicant incorporates by reference the disclosure of two US patents. If the applicant had the opinion, that the said disclosure contained matter which was essential for carrying out the invention as meant by Article 5 PCT, the applicant should have expressly incorporated this matter into the description. Otherwise, this passage should have been deleted from the description.

Re Item VIII

5. The claims do not define clearly, both as to language and technical aspects, the nature of the matter intended to be protected, as required by Article 6 PCT. In particular the following points in the claims are addressed:
 - 5.1. The feature "a method / an apparatus for performing a measurement" in **claims 1, 22 and 32** (p.52 l.3, p.56 l.21, p.58 l.22) is vague and indefinite and as such renders the scope of said claims unclear.
 - 5.2. The expression "in a region of a waver" used in **claims 1, 22 and 32** (p.52 l.3, p.56 l.21, p.58 l.22) would include also regions in the surrounding of said waver, but which would make only little sense from a technical point of view.
 - 5.3. The skilled person would not know what has to be understood by the terms "background carriers", "excess carriers", "junction depth" and "active dopants" used throughout the claims since the object to be evaluated has been defined in the independent **claims 1, 22 and 32** by the broad term of a "waver". The broad term "waver" should have been replaced with "semiconductor waver".
 - 5.4. The phrase "the number of excess carriers in the plurality" in **claim 1** (p.52 l.5-6)

is incomprehensible. What was meant appears to be "the number of excess carriers in the region".

The same applies to **claims 29 and 32**.

5.5. Furthermore, **claims 1, 29 and 32** do not meet the requirements of Article 6 PCT in that the matter for which protection is sought is not clearly defined. The claims attempt to define the subject-matter in terms of the result to be achieved ("... being modulated ... at a ... frequency that is sufficiently small to ensure that ...") which merely amounts to a statement of the underlying problem. The technical features necessary for achieving this result should have been added.

5.6. The feature "said/the substrate" in **claim 2** (p.52 l.19), **claim 4** (p.52 l.31), **claim 5** (p.53 l.8), **claim 10** (p.54 l.11), **claim 12** (p.54 l.27), **claim 28** (p.58 l.7), **claim 30** (p.58 l.17), **claim 32** (p.58 l.24), **claim 33** (p.59 l.9-10) and **claim 34** (p.59 l.16-17) lacks antecedence.

Analogous objections are raised for the features "the measured value_" in **claim 3** (p.52 l.25), "the measured value_" in **claim 7** (p.53 l.23), "second/first measured value" in **claim 8** (p.54 l.1,2; in claim 1, to which this claim refers, an amplitude and phase have been measured instead), "the predetermined data" in **claim 11** (p.54 l.17-18), "first/second measured value" in **claim 11** (p.54 l.18-20; in claim 1, to which this claim refers, an amplitude and phase have been measured instead), "predetermined substrate" in **claim 11** (p.54 l.22) and "the portion of probe beam measured by the interferometer" in **claim 35** (p.59 l.25).

5.7. The phrase "... obtained by the "measuring amplitude and phase"" in **claim 3** (p.52 l.23-24) is incomprehensible. What was meant appears to be "... obtained by the step of measuring amplitude and phase".

The same deficiency arises in **claim 8** (p.53 l.29, p.54 l.3) and **claim 11** (p.54 l.16,19).

5.8. Furthermore, the skilled person would not know what has to be understood by a "predetermined substrate (see **claims 3 and 11**). The respective claims are hence obscured.

5.9. The phrase "integrating the product of the multiplying with ..." is obscure. What

was meant appears to be "integrating the product of the multiplying step with ...". The same applies to "generating" in **claim 5** (p.53 l.1), "integrating" in **claim 5** (p.53 l.11), "measuring" in **claim 6** (p.53 l.15), "repeating" in **claim 6** (p.53 l.18), "measuring" in **claim 6** (p.53 l.19), "repeating" in **claim 8** (p.54 l.2), "measuring" and "annealing" in **claim 10** (p.54 l.12), "repeating" in **claim 11** (p.54 l.20), "measuring" in **claim 20** (p.56 l.9), "measuring" in **claim 21** (p.56 l.12), "operating" in **claim 23** (p.57 l.6), "comparing" in **claim 23** (p.57 l.9), "operating" in **claim 24** (p.57 l.13), "stimulating" in **claim 27** (p.58 l.3), "stimulating" in **claim 29** (p.58 l.10) and "operating" in **claim 30** (p.58 l.16).

- 5.10. The phrase "multiplying a result of the integrating (step)" in **claim 5** (p.53 l.11) is obscure. Are there different results of the integrating (step) ? What was meant appears to be "multiplying the result of the integrating (step)". Similar objections are raised for the features "a result" in **claim 26** and "a power" in **claim 35**.
- 5.11. The phrase "... to determine a simulated value of the amplitude and phase" in **claim 5** (p.53 l.11-12) contradicts itself since it is not possible to determine one value of two parameters, i.e. amplitude and phase.
- 5.12. In **claim 6** ("the modulation", p.53 l.15-16), it is not clear whether the modulation of the number of created excess carriers or the modulation of the portion of the probe beam reflected by the plurality of excess carriers as previously defined in **claim 1** was meant.
- 5.13. In **claim 9**, it is not clear whether the stated predetermined limit ("a predetermined limit", p.54 l.8) is another, additional predetermined limit or the predetermined limit as previously defined (p.54 l.6). The same applies to "a region" in **claim 32** (p.58 l.24).
- 5.14. **Claim 9** does not contain any method step for performing a measurement in a region of a waver. The same applies to **claim 26**.
- 5.15. The feature "changing an average number of excess carriers in the plurality" in

claim 11 is incomprehensible.

- 5.16. The feature "the lifetime of a carrier" in **claim 12** is obscure for several reasons:
Firstly, the lifetime is a statistical value which cannot be related to one single carrier. The same applies to **claims 18 and 36**.
Secondly, it is not clear whether a background carrier or an excess carrier is meant as both previously defined in claim 1.
- 5.17. "Amorphous silicin" (see **claim 15**) does not exist. What was meant appears to be "amorphous silicon".
- 5.18. The phrase "using a measurement device to obtain a measured value ..." in **claim 22** (p.56 l.26) makes only little sense. What was meant appears to be "using a measurement device to measure a value ...".
- 5.19. The features "a ... value of a signal affected by the stimulating" and "a ... value of the signal" in **claim 22** (p.56 l.26-28) are vague and indefinite. The scope of said claim is hence obscured.
The same applies to the feature "a value of a property" in **claim 25**.
- 5.20. In **claim 27**, it is not clear how the stated "plurality of excess carriers" (see p.58 l.2) relates to the "first/second numbers of charge carriers" as previously defined in claim 1. The scope of the claims as a whole hence is obscured.
Analogous objections are raised for **claims 29 and 30**.
- 5.21. The features "the number of excess carriers ... being modulated ... to cause a majority of carriers moving out of the region to transfer by diffusion" (p.58 l.25-27) and "... a signal obtained by interference between ..., the portion of the probe beam being modulated in phase with ..." (p.58 l.29 - p.59 l.2) in the apparatus **claim 32** relate to a method of using the apparatus rather than clearly defining the apparatus in terms of its technical features. The intended limitations are therefore not clear from this claim, contrary to the requirements of Article 6 PCT. The same deficiency arises for the features "a lock-in amplifier that detects amplitude and phase of a signal obtained by interference between ..." in **claim 3** (p.59 l.5-10), "wherein the detector is used to measure a difference between a

first interference signal obtained by ... and a second interference signal obtained by ..." in **claim 34** (p.59 l.13-10), for the features of **claim 36** and for the feature "a laser that generates ..." (p. l.) in **claim 37**.

5.22. The feature "moving out of the region to transfer by diffusion" in **claim 32** (p.58 l.26-27) is incomprehensible.

5.23. Furthermore, the feature "an interferometer located in a path of a signal obtained by interference ..." in **claim 32** (p.58 l.29-30) makes only little sense from a technical point of view: Firstly, an interferometer should be located in the path of one or more light beams (and not in the path of a signal), and secondly, usually it is the interferometer which produces the interference.

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

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PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL PRELIMINARY
EXAMINATION REPORT
(PCT Rule 71.1)

Date of mailing (day/month/year)	30.03.2001
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Applicant's or agent's file reference M-7045 PCT	IMPORTANT NOTIFICATION
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International application No. PCT/US00/07357	International filing date (day/month/year) 20/03/2000	Priority date (day/month/year) 22/03/1999
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Applicant BOXER CROSS INCORPORATED

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

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